Knoxville's Energy Inventory:
Government and Community Analysis and Strategic Plans

CITY OF KNOXVILLE
BILL HASLAM, MAYOR

The City of Knoxville Energy & Sustainability Initiative is helping define a new paradigm for Knoxville's development: one that reduces energy consumption while enhancing the quality and competitiveness of our community. In Knoxville, sustainability is about offering more and better choices for citizens to live, work, and play in the heart of the city. It is about reusing existing infrastructure, sending less waste to landfill, and building a transportation network that supports walking, biking, public transit and alternative fuels and vehicles. It is about minimizing the costs of operating office buildings while maximizing the health and productivity of their occupants. It is about increasing the availability of clean, renewable energy and creating new jobs. Sustainability is about good public policy, responsible resource stewardship, and making the choices necessary to protect the best of Knoxville for future generations.

Energy & Sustainability Task Force

In August of 2007, Mayor Bill Haslam hosted the first meeting of the Energy & Sustainability Task Force, a 15-member advisory committee comprised of government, industry, business, and non-profit leaders. The Task Force was charged with developing recommendations for policies and programs that would reduce energy consumption, cost, and emissions and increase Knoxville's overall sustainability. By focusing on sustainability, we will strengthen Knoxville's long-term ability to withstand rising fossil fuel prices, mitigate air pollution, and seize the economic development opportunities afforded by the transition to clean energy technologies. We will also make Knoxville a regional leader in the worldwide effort to reduce greenhouse gas emissions and forestall the potential consequences of global climate change. Task Force members helped chart the course for meeting these objectives, and the elements of the Energy & Sustainability Strategic Plan outlined on Pages 6-9 emerged from this effort. Many activities are already well underway, and we look forward to continued collaboration with the Task Force as we continue to develop new implementation pathways.

Task Force Members:

Knox County, Public Building Authority, Tennessee Valley Authority, Knoxville Utilities Board, Oak Ridge National Lab, Alcoa, U.S. Green Buildings Council, Knoxville's Community Development Corporation, Southern Alliance for Clean Energy, Foundation for Global Sustainability, Metropolitan Planning Commission, Knoxville Chamber, Councilman Chris Woodhull, Blessed Earth, University of Tennessee.

Energy Baseline Inventories

Knoxville's work plan for the Energy & Sustainability Initiative is well-charted by local governments across the country and world, many of which are members of the organization *ICLEI—Local Governments for Sustainability (formerly the International Council for Local Environmental Initiatives)*. The City joined the ICLEI network in July 2007 in order to take advantage of the resources offered to members, including access to case studies, software and methodologies developed to assist governments working towards greater sustainability at the local level. Using ICLEI's *Clean Air and Climate Protection Software*, the City has inventoried baseline energy consumption, expenditures, emissions and other sustainability indicators like water consumption and waste generation associated with both city government operations and the Knoxville community as a whole. This report summarizes the inventory findings, establishes greenhouse gas reduction targets, and presents an outline of existing and proposed policies and programs intended to strengthen Knoxville's urban environment and improve economic opportunity while we do our part to address the most pressing environmental challenge of our time.

This summary report was prepared by the City of Knoxville Policy & Communications Department, with research and writing by Erin Burns, Beth Reed Fritts and Madeleine Weil. For a more detailed description of inventory methods and results, see "City of Knoxville Energy & Emissions Report: 2005" at www.cityofknoxville.org/policy/energy.

2005 Government Baseline Inventory Results

The City owns and operates close to 100 buildings and 40 parks and athletic fields. There are approximately 1,200 vehicles in the City fleet. Knoxville's roadways are lined by over 29,000 streetlights and traffic signals manage traffic flow at about 350 intersections. City employees drive to work from all over the region, with an average commute of approximately 20 miles round-trip.

The City's public infrastructure, including its employees, enables city government to efficiently manage administrative responsibilities and provide the services, amenities and leadership that Knoxville residents have come to expect.

In 2005, the City of Knoxville spent roughly **$7.9 Million** on energy—about **4.3%** of the total City budget. Total energy, water, and waste costs equaled nearly $8.5 million. Understanding how these costs break down is the first step towards being able to reduce them.

The 2005 Government Baseline Inventory provides a snapshot of energy and water consumption, waste disposal, and emissions generation by city government's network of buildings, facilities, vehicles, and employees.

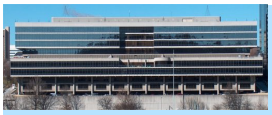
In 2005...

BUILDINGS

Knoxville's municipal buildings and facilities consumed:

- 32.6 million kWh of Electricity
- 569.1 thousand therms of Natural Gas
- 85.8 million gallons of Water

Total Energy Consumed:
166,954 million British Thermal Units (BTU)
Total Energy and Water Cost: Over $3.7 million
Total Greenhouse Gas (GHG) Emissions:
26,993 tons CO_2 equivalent (eCO_2)



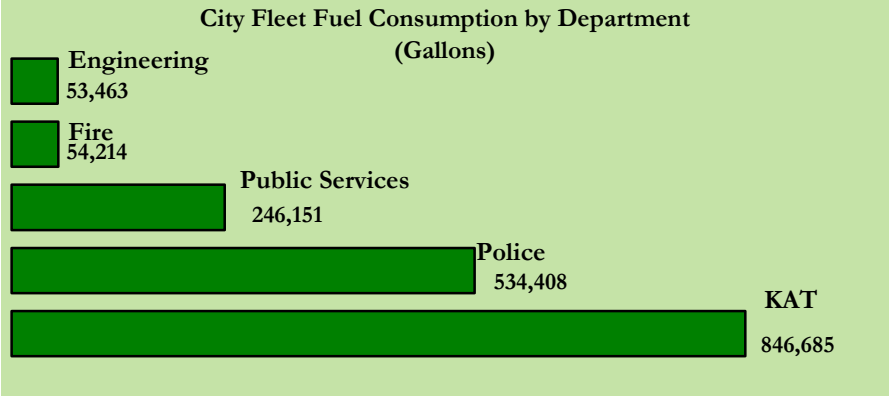
Each day about 3,000 people—1,500 City of Knoxville and Knox County employees and 1,500 visitors—work at or visit the City County Building, which houses offices and meeting spaces as well as judicial courts and the county jail. The hub of local government operations, the City County Building consumed 59,297 million BTUs of energy and 17.5 million gallons of water in 2005. The 2005 utility bill—including waste disposal costs—for the building totaled $1,056,000. The City's share was approximately one-third, or $364,229. To help offset the eCO_2 emissions from City facilities such as the City County Building, the City purchased a total of 3,000 TVA Green Power Switch Blocks.

FLEET

Knoxville's fleet vehicles and equipment traveled the equivalent of approximately 27.6 million miles over the course of the year and consumed approximately:

- 897,300 gallons of Gasoline
- 179,850 gallons of Diesel
- 645,850 gallons of Biodiesel (B20).

Total Energy Content of Fuel: 309,173 million BTU
Total Fuel Cost: $3,046,328
Total GHG Emissions: 23,812 tons eCO_2

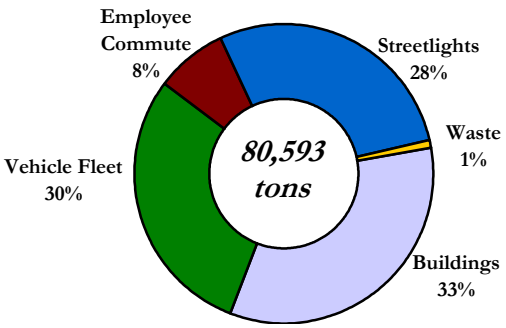


EMPLOYEE COMMUTE

City employees drove approximately 9.6 million miles during commutes to and from work and consumed approximately 589,000 gallons of fuel. The cost of fuel for employee commutes is not included in the Government Inventory (because the City does not pay the bill), though we have chosen to include the associated emissions. There is no city government without city government employees, and we each are responsible for our own commutes.

GHG EMISSIONS

Government eCO_2 Emissions by Sector



WASTE

Approximately 1,237 tons of non-recycled waste was generated and thrown away at City-owned facilities in 2005. At the City-County building, employees recycled about 49 tons of paper and cardboard, but sent 84 tons of garbage to the landfill. Approximately 23 tons were recyclable materials that could have been diverted from the waste stream.

STREETLIGHTS

Streetlights and traffic signals accounted for one of the City's largest energy expenditures in 2005. The 29,630 streetlights consumed 26.8 million kWh of electricity at a cost of over $1.3 million, and the traffic signals at 350 intersections consumed 4.3 million kWh at a cost of $209,000. KUB charged an additional $1.5 million for maintenance and repairs to the streetlight system.

What is eCO_2?

Different greenhouse gases—like carbon dioxide (CO_2), methane, and nitrous oxide—warm the atmosphere at different rates. eCO_2 is a common unit that accounts for the atmospheric impact of each gas relative to that of carbon dioxide and allows all greenhouse gas emissions to be quantified using a single number.[1]

City Government eCO_2 - Top Ten

Total City GHG Emissions from Energy = 79,889 tons eCO_2
Total City Energy Costs = $7.9 Million

Source	eCO_2	% of Total CO_2	Cost	% of Total Energy Cost
Street & Traffic Lights	22,771	28.5%	$1,511,508	19.2%
Police Fleet	11,345	14.2%	$896,085	11.4%
KAT Fleet	6,985	8.7%	$1,198,686	15.2%
Employee Commute	6,314	7.9%	$0	0%
Convention Center	5,335	6.7%	$618,822	7.9%
City County Building	3,619	4.5%	$331,340	4.2%
Public Services Fleet	2,600	3.3%	$472,434	6.0%
World's Fair Park	1,973	2.5%	$189,552	2.4%
Safety Building	1,912	2.4%	$178,690	2.3%
Civic Coliseum	1,572	2%	$171,704	2.2%

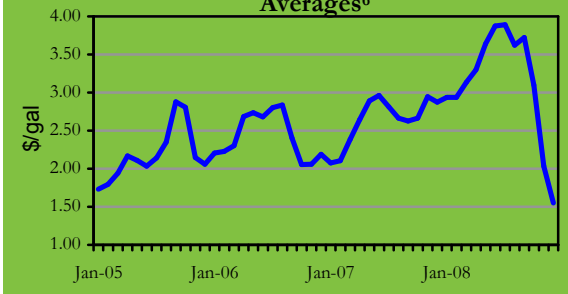
The entities above are responsible for 80% of City Government's total eCO_2 emissions from energy consumption (not including waste-related emissions) and 70% of its energy costs.

Energy Costs

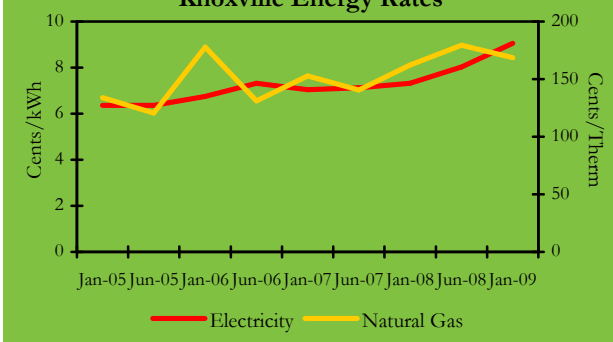
The cost of energy is rising and becoming harder to predict.

National average gas prices rose steadily by approximately 140% between January 2000 and December 2007 then spiked to $4.11/Gal. in July 2008 and plummeted to $1.65/Gal. before the end year.[2] Within six months, global prices for a barrel of crude oil hit both a five-year high of $145 and a five-year low of $30.[3] Electricity and natural gas costs in Knoxville have increased. TVA's 20% rate increase in October of 2008 was the biggest since 1974 and primarily triggered by the rising costs of coal and natural gas.[4] Less than two months later, TVA announced that rates would fall back by 6% in January of 2009.[5] As residents, businesses, and organizations seek to budget for transportation, heating, and electricity costs, the probability of future rate increases and price volatility underlines the necessity of reducing energy consumption.

Knoxville Monthly Gas Price Averages[6]



Knoxville Energy Rates[7]



2005 Community Baseline Inventory Results

With a population of approximately 180,000, Knoxville is the third largest city in Tennessee and the transportation and economic hub for the eastern region of the state.

Within its 103 square miles, Knoxville has approximately 1,274 miles of roads, including 210 miles of state and federal highways and interstates. Situated on the banks of the Tennessee River and along the major east-west rail line, shipping has always played an important role in Knoxville's economy.

Knoxville's 17,000+ businesses employ about 88,850 people. The biggest local employers are Covenant Health, University of Tennessee, and Knox County Schools, and the largest overall industry sectors include retail trade, health care, and educational services.[8] The Knoxville economy registers over $4.4 billion of retail sales each year*, and the value of retail sales per capita is twice that of the state.[9]

The 2005 Community Baseline Inventory estimates how much energy the Knoxville community uses, how much waste it generates, and how these activities contribute to pollution and greenhouse gas emissions. Although the city is closely linked with Knox County and the larger East Tennessee region, the inventory only includes data associated with homes, businesses and travel within the city limits.

*2002 Census figure[8]

In 2005...

ELECTRICITY

The Knoxville community consumed approximately 2,438,817 MWh of electricity, resulting in the emission of 1,781,320 tons eCO_2. A MWh (megawatt hour), equal to 1,000 kWh (kilowatt hour), is roughly the amount of electricity consumed by an average household in a little more than one month. In 2005, about 825,401 MWh—or 34%—were consumed within homes, and 1,613,417 MWh—or 66%—were consumed by commercial or industrial establishments. Residential and commercial emissions were offset by the purchase of 59,612 TVA Green Power Switch blocks. Knoxville's electricity is generated by the TVA and distributed to end-users by the Knoxville Utilities Board.

TVA's Power Mix:
62% Coal
28% Nuclear
10% Hydroelectric[10]

Tennessee ranks 17th versus other U.S. states for total energy consumption per capita. It ranks 2nd for per capita residential electricity consumption alone. Electricity consumption per capita grew by 20% between 1980-2005.[11]

NATURAL GAS

Approximately 34% of Knoxville-area residents heat their homes with natural gas.[12] Commercial and industrial purposes account for the remaining natural gas consumption in the community.[13] Knoxville's homes, businesses, and industries consumed 78,871 thousand therms of natural gas in 2005, generating 487,280 tons of eCO_2 emissions.

WASTE

Approximately 287,208 tons of waste was generated in Knoxville—more than 18 times the estimated collective weight of all Knoxville citizens.[14]

- 32,412 tons mulched
- 6,333 tons recycled
- 248,463 tons sent to landfills

Landfill waste generated about 6,874 tons of methane emissions, some of which was flared off or used to generate electricity. Net emissions from waste totaled 15,886 tons eCO_2.

TRANSPORTATION

In 2005, over 2.9 billion miles were traveled on Knoxville's roads. Although nearly 222 million of these miles were clocked as pass-through interstate traffic, total miles traveled resulted in the emission of nearly 2 million tons of eCO_2 in the Knoxville area.

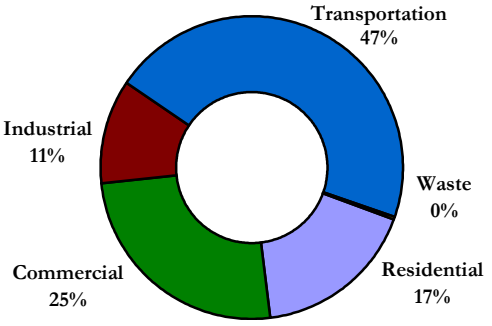
2.9 Billion Miles = Distance To the Moon and Back X 6,150

Assuming average US fuel economy and prices, this number of vehicle miles traveled indicates:

Consumption of approximately:	…and fuel costs of approximately:[15]
148.5 million gallons of Gasoline	$ 337 million for Gasoline
31.5 million gallons of Diesel	$ 75.7 million for Diesel

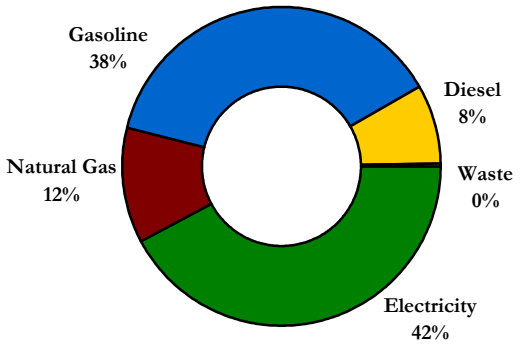
GHG EMISSIONS

BY SECTOR



Total GHG Emissions: 4,214,985 tons eCO_2
Per Capita GHG Emissions: 23.3 tons eCO_2[16]

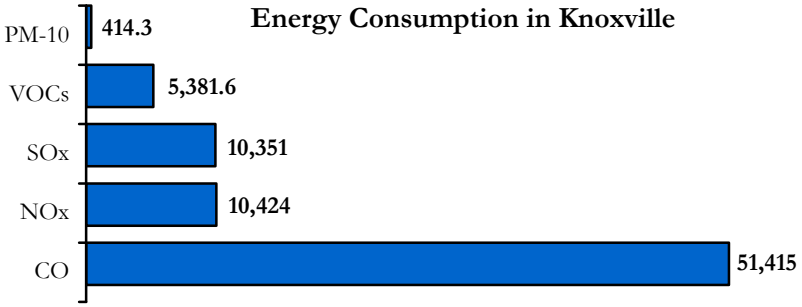
BY SOURCE



AIR QUALITY

Knoxville's energy consumption also contributes to emissions of criteria air pollutants, or pollutants that are regulated by the U.S. EPA because of their negative impacts on public health. Currently, the air in Knox County does not meet National Ambient Air Quality Standards for ground level ozone and fine particulate matter.[17]

Criteria Air Pollutant Emissions (tons) from Energy Consumption in Knoxville



PER CAPITA NUMBERS

In 2005, on average, each of Knoxville's 180,576 residents was responsible for consuming or generating the following:

- 4,571 kWh of Electricity
- 121 therms of Natural Gas
- 16,225 gallons of Water
- 1,120 lbs of Landfilled Garbage

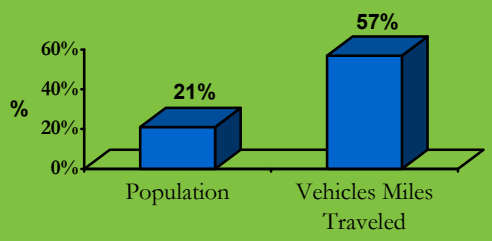
These numbers are from Knoxville's residential sector alone and do not include energy, water, or waste data from commercial or industrial facilities.

Transportation

Roughly 2.9 billion vehicle-miles were traveled on Knoxville's roadways in 2005, producing about 1.9 tons of eCO2, or about 47% of community emissions. Approximately 20% of local interstate vehicle-miles-traveled (VMT) was attributable to pass-through traffic on I-275 and I-40, according to a study by the Knoxville Regional Transportation Planning Organization.[18]

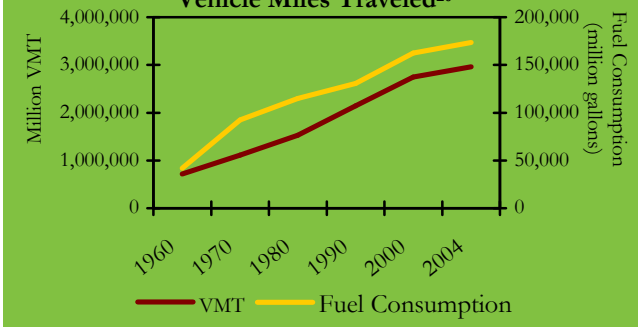
In Knoxville and the rest of the country, VMT has been growing at a pace that far exceeds population growth.

Knoxville Increases Between 1990 and 2007 [19]

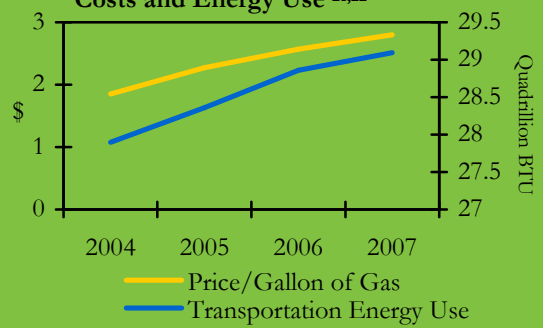


For much of the 1990's and early 2000's, as VMT grew substantially, the average fuel economy of the nation's vehicle fleet improved only slightly. As a result, fuel consumption increased by 33% between 1990 and 2005.[20]

National Fuel Consumption and Vehicle Miles Traveled[20]



National Transportation Fuel Costs and Energy Use [21,22]



Municipal Initiatives

Strategic Plan

Knoxville City Government

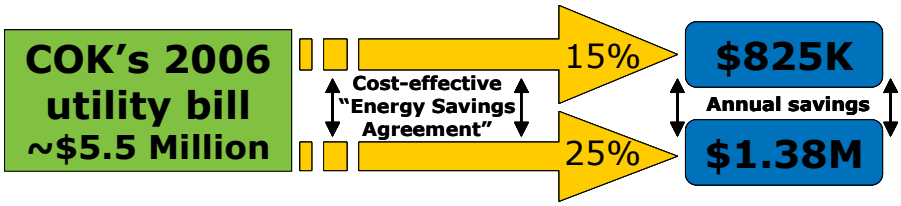
This section describes ongoing efforts and new opportunities for the City of Knoxville to reduce energy consumption, costs and associated emissions, and to increase the overall environmental sustainability of city government operations.

As we in city government work to make Knoxville a more sustainable community overall, it is important that we first look at ourselves. Numerous city departments, including Engineering, Public Services, Fleet, Purchasing, Community Development, Parks, KAT, and Policy & Communications have been involved in determining how best to implement sustainability objectives through city policies and practices.

Though city government GHG emissions are only a small portion of the community's total, we have an essential role to play in leading by example.

Reduce energy and water consumption at all city facilities.

- The City has contracted with energy services company AMERESCO to audit current energy and water consumption and propose cost-effective efficiency and renewable energy upgrades at all facilities.
- Using a performance-contracting model, we plan to finance some or all of the upfront costs of the upgrades with the energy and water savings produced over time.
- By implementing all cost-effective efficiency measures, we can reduce annual energy and water consumption at city facilities by as much as 15-20% and earn Energy Star[23] and/or LEED[24] certifications on select buildings.
- Anticipated energy conservation measures (ECM's) include lighting system retrofits, water heater upgrades, building envelope enhancements, solar power generation, replacing HVAC electronic control systems and more.
- Additional benefits are expected to include better integration of building systems maintenance, improved indoor air quality and occupational conditions, and reduced mechanical and structural degradation.



Improve the efficiency of traffic signals and streetlights.

- The City's Engineering Department has replaced about 45% of all traffic signals with LEDs (light emitting diodes) and plans to complete the transition during the summer of 2010. Because LEDs use ~90% less energy than traditional incandescent traffic signals[25] and require less maintenance, we expect this project to produce a total cost savings of over $280,000 per year.
- We are working with TVA, KUB and the Electric Power Research Institute (EPRI) to conduct a pilot test of LED streetlights in downtown Knoxville. The pilot will help determine our best options for making the transition to the next generation of streetlights.

Build new facilities that are energy efficient, environmentally friendly and cost less to operate.

The new Transit Center will feature geothermal and solar energy. It will integrate recycled materials and showcase a green roof.

- The new Knoxville Area Transit (KAT) Downtown Transit Center will be the City's first LEED-certified building. It will reduce energy use by 42% and water use by 30% versus a comparable, code-compliant building. *Next Step: Adopt a policy that requires LEED certification for new construction of municipal buildings larger than 5,000 ft² or costing more than $2 million.*

Reduce the amount of waste generated by municipal operations and purchase environmentally responsible products.

- In partnership with Knox County, the City's Public Services Department will implement a single-stream recycling program in the City-County Building, with a goal of recycling 75% of the building's waste materials by 2012.
- *Next Step: Integrate environmental and energy efficiency objectives into city purchasing guidelines.*
- *Next Step: Develop outreach materials to educate City employees about how to minimize waste, recycle, reduce energy and water use, and make environmentally responsible purchasing decisions.*
- *Next Step: Expand single-stream recycling program to other City facilities.*

Reduce the fuel consumption, emissions, and maintenance costs of the City fleet.

- The City's Fleet Division has deployed a new fuel management system that allows them to track fuel usage by each fleet vehicle. A new AVL (automatic vehicle locator) system will allow for more efficient route management, reducing vehicle-miles-traveled.
- All new light duty vehicles are "flex-fuel," meaning that they can use E85 ethanol.
- Most older, heavy duty models have been replaced by new models that meet EPA's 2007 emission standards (these emit ~90% less fine particulate matter).
- Vehicle purchasing practices prioritize fuel efficiency. Each vehicle is only as big and powerful as it needs to be to do its job, and no more so.
- All City employees are required to follow a mandatory anti-idling policy while operating city-owned vehicles.
- *Next Steps: Pursue opportunities to add alternative fuel, hybrid, and electric vehicles to the City fleet. Seek grants for alternative vehicles, fuels and fueling infrastructure, and emission control equipment. Continue to replace older vehicles with new models that meet new emission standards.*

Support Knoxville Area Transit's efforts to make their operations cleaner, greener and more efficient.

- KAT will reduce bus emissions at the new transit center by employing an AVL system to minimize "dwell time," limiting bus idling to five minutes, retrofitting older vehicles with diesel particulate filters, maintaining a consistent bus replacement schedule, and utilizing alternative fuels and vehicles where possible.

kat
KNOXVILLE
AREA TRANSIT

Reduce vehicle-miles-traveled by City employees during commutes to and from work.

- *Next Step: Promote alternative commutes by encouraging employee participation in the SmartTrips[26] program and rewarding employees who walk, bike, car-pool or take the bus to work.*

Climate Change

Climate Change: "Any significant change in measures of climate lasting for an extended period of time (decades or longer)"[27]

There is now general agreement among scientists that the climate system is warming and that greenhouse gas emissions from human activity are "very likely" causing these climatic changes.[28]

Local Effects

Records show that over the last century, average temperatures have increased 1°F in Nashville, and climate models predict Tennessee temperatures could increase statewide by an additional 2-3°F by 2100. Increased precipitation will likely accompany the temperature changes, though model results vary in their predictions about the degree of change.

These climatic changes may trigger a variety of different local impacts. Higher temperatures could cause more heat-related deaths and illnesses as well as increased concentrations of ground-level ozone, which is associated with respiratory inflammation, reduced lung function, and asthma. Combined with increased precipitation, the warming trend could also increase respiratory allergies, as well as agricultural pests and disease-carriers like mosquitoes and ticks.[29]

The natural gems of our community—the Great Smoky Mountains—is particularly threatened by increasing air pollution and the changing climate. The diversity of species in the mountains is highly dependent on specific air quality and climate conditions. Increased air pollution will further weaken ancient forests, and a warmer and wetter climate could push many species to higher elevations. Populations of some species, including trout and Fraser firs may be dramatically reduced, and others may disappear from our area. [30]

Even if precipitation increases overall, the frequency and severity of extreme events such as floods and draughts may increase. If so, the resulting impacts on infrastructure, agriculture, and water quantity and quality will have both health and economic effects.[31]

Strategic Plan

Knoxville Community

The City of Knoxville's organizing goals during Mayor Haslam's first term were about building stronger, safer neighborhoods, providing reliable city services at a competitive price, developing an energized downtown, and creating more and better jobs. During the second term, we have positioned sustainability objectives alongside each of these goals.

Sustainable development, or economic growth that meets the needs of present generations without compromising the ability of future generations to meet their own needs, is the type of development we are pursuing in Knoxville. By taking stock of our community's strengths as well as its weaknesses, we can establish a blueprint for investing in Knoxville's future in ways that preserve the environment and produce economic opportunity.

The energy efficiency of a community, the quality of its air and water, its level of traffic congestion – all of these are characteristics that impact value and livability. The measures outlined in this section will increase Knoxville's value while reducing its contribution to global climate change.

Community Initiatives

Reduce transportation-related fuel consumption and emissions.

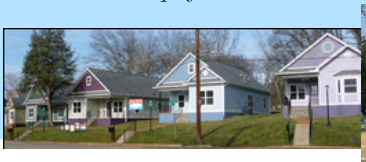
- The City's planning and development efforts are aimed at increasing density (residential, commercial, and industrial, where appropriate) in the central city, reducing travel distances for regular trips. They also incorporate "complete street" designs that facilitate walking, biking, or using public transit.
- KAT's strategic planning efforts, including the Transit Development Plan due out in 2009, seek to improve the coverage, convenience and efficiency of Knoxville's public transit system.
- The City will continue to expand and connect Knoxville's network of parks and greenways.
- *Next Step: Catalyze market development for alternative fuel vehicles, including electric vehicles. Engage in partnerships intended to break down barriers that hinder local growth in alt-vehicle ownership.*
- *Next Step: Support commuter-oriented programs such as SmartTrips*

Redevelopment plans for inner-ring neighborhoods like Downtown North, the South Waterfront and the Cumberland Avenue Corridor demonstrate sustainable design and planning. Seeking to enhance opportunities to live, work, and play in the heart of the city, these projects blend vibrant economic activity with attractive streetscapes and healthy natural environments. Form-based codes promote a mix of uses and development of energy efficient and environmentally friendly structures; complete streets encourage alternative means of transportation such as walking and biking; and innovative storm water management and landscape designs model best practices. Most importantly, these projects are revitalizing Knoxville's urban core by reusing existing buildings and infrastructure, which avoids waste of materials and energy and prevents further sprawl.

Improve the energy efficiency of local homes and buildings.

- The City's Community Development Department and housing partners are institutionalizing energy-efficient and environmentally friendly building practices in affordable home construction and renovation projects.

Recognizing the lasting value of improving the energy efficiency and sustainability of low-income homes, the City of Knoxville's Community Development Department is hard at work integrating sustainable principles into its housing programs. The City has committed to achieving Energy Star certification for all city-funded affordable housing construction and renovation projects. Using Empowerment Zone funds, Knox Housing Partnership and the Knoxville-Knox County Community Action Committee built a set of seven homes in the Five Points neighborhood that received LEED Gold Certification from the US Green Building Council in recognition of the homes' exceptional energy efficiency and environmental sustainability. They are the first affordable homes to be certified LEED-Gold in the nation. This project has set a new standard for affordable home construction in Knoxville.



- The City's Buildings Department adopted the International Code Council's most recent commercial and residential energy codes. This is first time Knoxville has ever had an energy code.
- *Next Step: Establish programs to strategically invest Energy Efficiency & Conservation Block Grant dollars and other funds in advanced weatherization, renewable energy, and energy efficiency repairs and replacements for Knoxville's buildings and homes.*

- *Next Step: Build market demand for green building certification programs like LEED and EnergyStar through education and incentives. Tie development incentives like TIFs and Pilots to LEED or EnergyStar certification.*
- *Next Step: Set local targets for numbers of new and renovated High Performance Homes (≥ HERS[32] 70) and Net Zero Energy Homes and build market recognition for HERS ratings as an indicator of home value.*

Grow the proportion of clean, renewable energy powering the Tennessee Valley Authority's electricity grid.

- Through the Knoxville Solar America Cities Program, we are reducing local barriers to solar power *(see text box to the right).*
- We are working with TVA and KUB to increase participation in the Generation Partners and Green Power Switch programs, building both supply and demand for green electricity.

A partnership between the City of Knoxville, TVA, KUB, the CBID and other key organizations, the Downtown Green Power Switch campaign has increased green power purchases among downtown residents and businesses.

Ensure the quality and quantity of local water supplies.

- City departments are piloting water-friendly development features in a number of city projects, i.e. drought-tolerant landscaping, pervious pavement treatments, curb-less medians and street design, green roofs, and water recovery systems.
- The City's Buildings Department adopted a supplemental section to the city building code to allow for grey water recycling.

Reduce the amount of waste sent to the landfill; reduce, reuse and recycle wherever possible.

- Through the Model Cities Initiative (see text box below), we are evaluating options for substantially increasing recycling rates.
- We are targeting efforts to increase recycling among certain sectors, i.e. special events, restaurants, apartment & condo buildings.
- *Next Step: Establish a community-wide recycling target.*

The City of Knoxville is the second city to be selected by the American Beverage Association and the Climate Group to participate in their "Model City Initiative." Grant services will evaluate the City's current waste management and waste reduction systems and propose new practices, with the goal of improving recycling participation while maintaining cost-effectiveness and public satisfaction.

Integrate sustainability objectives into economic development outreach and job creation initiatives.

- Through partnerships with the Knoxville Chamber and the Tennessee Department of Economic & Community Development, we are positioning Knoxville to attract green businesses and manufacturing facilities, with a particular focus on the solar industry.
- MBA students from the University of Tennessee are developing an assessment of opportunities to build "green collar" jobs in Knoxville.

Encourage community engagement in sustainability efforts.

- With the Knox County Library, we started a new lunch & learn series for community conversations about what sustainability means in Knoxville.
- The City's Public Services Department co-chairs EarthFest, the region's largest Earth Day event.

Knoxville 2008 Solar America City

U.S Department of Energy
Powering the Cities of Today
SOLAR AMERICA CITIES™

As one of the 25 DOE Solar America Cities, Knoxville is working to accelerate the adoption of solar energy technologies. The DOE grant offers financial and technical resources to help lay the foundation for the development of a sustainable solar infrastructure. Through this program, the City of Knoxville is working with Oak Ridge National Laboratory, TVA, KUB, the Southern Alliance for Clean Energy, the Tennessee Department of Economic & Community Development and others to remove market barriers through a comprehensive, city-wide approach. Program initiatives are designed to educate citizens about solar power, strengthen local solar technology supply and demand markets, increase the visibility of solar power, and provide a model for other cities to follow.

The Knoxville Solar America Cities work plan includes the following initiatives:

- Install solar arrays in high-visibility locations, starting with the Downtown Transit Center.
- Design educational displays to accompany the solar arrays at the new Transit Center and Ijams Nature Center.
- Develop a consumer-oriented website and workshop series to address "how-to" questions about solar.
- Host training opportunities for code inspectors, utility personnel and solar technology installers.
- Incorporate solar technology into Community Development's low-income housing programs.

BROWN BAG GREEN BOOK

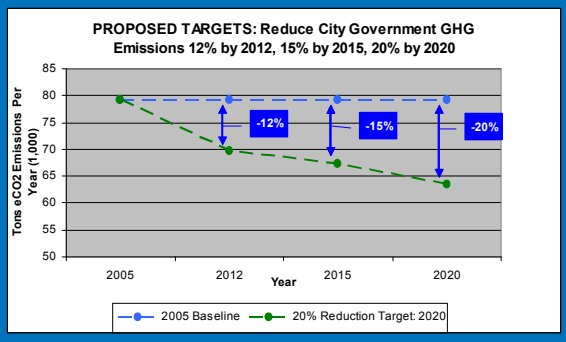
The goal of this program is to increase installed solar capacity from 30kW to 300kW by 2010 and to 3MW by 2015.

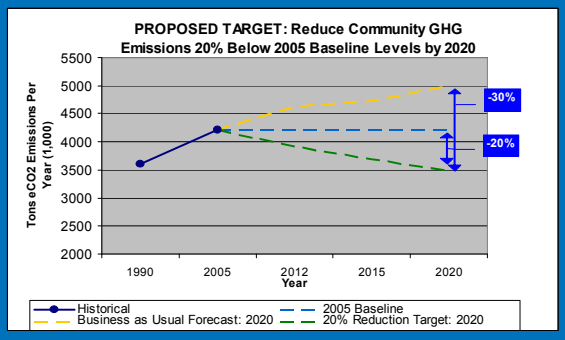
For more information, please visit: www.cityofknoxville.org/policy/solar

Summary

Knoxville's Challenge

Since the International Panel on Climate Change released their Fourth Assessment Report in 2007 detailing the scientific evidence surrounding global climate change, a consensus has emerged around the need for aggressive greenhouse gas reduction targets. Though Knoxville's emissions are a tiny piece of the global inventory, we are committed to doing our part. The GHG reduction targets proposed below are both ambitious and achievable, though achieving them will likely require state and federal policy changes in addition to local action.





This report establishes a blueprint for where we are and where we want to go, but it doesn't get us there. The next phase of work for the City and its Energy & Sustainability Task Force will involve implementing existing initiatives while pursuing new opportunities. Continued support from our community partners will be essential to maintaining momentum towards shaping Knoxville's sustainable future.

CITY GOVERNMENT EXISTING INITIATIVES AND NEXT STEPS	
Existing Initiatives	Lead City Department/s and Key Community Partners
Reduce energy and water consumption at all city facilities	
Ameresco Performance Contract.	Policy & Communications, Purchasing Ameresco, ORNL, KUB
Improve the efficiency of traffic signals and streetlights	
LED Traffic Signal Conversion and LED Streetlight Pilot Test.	Engineering, Policy & Communications EPRI, TVA, KUB
Build new facilities that are energy efficient, environmentally friendly, and cost less to operate	
LEED-certified KAT Downtown Transit Center.	KAT, Operations & Efficiency PBA, Intermodal Architects Associates, Johnson & Galyon Construction
Reduce the amount of waste generated by municipal operations and purchase environmentally responsible	
Single-Stream Recycling for the City-Coun Building.	Public Services, Policy & Communications, Purchasing PBA, Knox County Government
Reduce the fuel consumption, emissions and maintenance costs of the City fleet	
Fuel management and AVL systems, flex-fuel and lower-emissions vehicle purchases anti-idling policy.	Fleet Knoxville Clean Cities Coalition
Support KAT's efforts to make their operations cleaner, greener, and more efficient	
AVL system, anti-idling policy, vehicle retrofits/replacements, alt-fuel utilization.	KAT Knoxville Clean Cities Coalition
Reduce vehicle-miles-traveled by city employees during commutes to and from work	
Promote SmartTrips program.	Policy & Communications TPO
COMMUNITY EXISTING INITIATIVES AND NEXT STEPS	
Existing Initiatives	Lead City Department/s and Key Communit Partners
Reduce transportation-related fuel consumption and emissions	
Increasing density, "complete street" designs, KAT Transit Development Plan, parks/greenways expansion.	Policy & Communications, South Waterfront, Engineering, Public Services, KAT, Parks & Recreation, MPC, TPO
Improve the energy efficiency of local homes and buildings	
Energy-efficient building practices for affordable home construction and renovation, energy code revisions.	Community Development, Buildings, Policy & Communications CAC, KHP, KCDC, USGBC, KUB, TVA, SACE, ORNL
Grow the proportion of clean, renewable energy powering the Tennessee Valley's electricity grid	
Solar America Cities program underway. Increase participation in Green Power Switch and Generation Partners.	Policy & Communications, Community Development KUB, TVA, ORNL, SACE, TNECD
Ensure the quality and quantity of local water supplies	
Water-friendly development features pilote in city projects. Grey water code adopted.	Engineering, Buildings, South Waterfront USGBC
Reduce the amount of waste sent to the landfill; reduce, reuse and recycle wherever possible	
Model Cities Initiative underway. Targeted recycling outreach for special events, other high-priority sectors.	Public Services, Policy & Communications, Special Events Climate Group/ABA, UT ISSE, KRC, Ijams
Integrate sustainability objectives into economic development outreach and job creation initiatives	
Particular focus on clean energy businesses and "green collar" jobs.	Policy & Communications, Community Development Chamber, IDB, TNECD, UT
Encourage community engagement in sustainability efforts	
"Brown Bag – Green Book" series launched, EarthFest.	Policy & Communications, Public Services Knox County Library, UT, KKB

Expectations and Milestones	Next Steps
Achieve 15%-25% efficiency gains (TBD), earn Energy Star and/or LEED certifications on select buildings, integrate renewable energy. Implementation 2009-2010.	Publicize progress and share lessons-learne with other Knoxville institutions.
Complete traffic light transition 2010. Reduce electricity by 3.8 million kWh per year (2,625 tons eCO2), save over $280,000 per year. Downtown streetlight field test 2009.	Evaluate options for streetlight upgrades and implement.
Reduce energy use by 42%, water use by 30% compared to standard new construction. Integrate renewable energy, green roof. Transit Center opens 2010.	Adopt a policy that requires LEED certification for new construction of certain municipal buildings.
products	
Recycle 75% of City-County building waste materials by 2012.	Integrate environmental objectives into purchasing guidelines, educate employees, expand recycling initiative.
Install fuel management and AVL systems 2009-2010. Ongoing idle reduction and vehicle diversification.	Determine fuel reduction target. Add alt-fuel, hybrid, electric vehicles to City fleet. Build alt-energy fueling infrastructure.
Minimize PM2.5 emissions, particularly at the new Downtown Transit Center.	Apply for grants to speed retrofits and replacements.
	Determine alt-commute target. Develop incentive program.

Expectations and Milestones	Next Steps
Successfully redevelop inner core neighborhoods. Diversify transportation alternatives.	Catalyze market development for alternative vehicles and promote alternative commutes.
Focus on energy efficiency for affordable homes, reduce energy bills for those who need it most. Introduce comprehensive, utility-based efficiency programs 2009-2010.	Determine energy efficiency for residential, commercial, industrial sectors. Develop programs to reach targets. Tie LEED or EnergyStar certification to development incentives (Pilots, TIFs).
Solar America Cities goals – reach 300KW installed solar capacity by 2010, 3MW by 2015.	Implement the Solar America Cities work plan. Market and educate about the importance of clean, renewable energy.
South Waterfront project and others integrate innovate storm water management techniques.	Apply best practices widely through code changes and/or development incentives.
Analyze recommendations from Model Cities Initiative 2009.	Set waste diversion target and implementation strategy.
	Formalize clean energy business, green collar jobs development strategy.
"Brown Bag – Green Book" – host monthly events with community leaders.	Develop other targeted community engagement strategies.

What Can You Do?

Reduce your home's energy consumption

- Use KUB's customized energy audit to identify the best ways to reduce energy and water use in your home. See www.kub.org.
- Switch your incandescent light bulbs to compact fluorescent light bulbs.
- Add insulation to your walls and tighten up your window and door seams.
- Turn off computers, TVs, lights, and other appliances when not in use.
- Consider installing a solar hot water system.
- Hire a Home Energy Rating System (HERS) assessor to determine how the energy performance of your home compares with others.

Reduce your home's water consumption

- Add a brick or bottle to your toilet water tank to reduce water use when you flush.
- Install water savers on sink and shower faucets.
- Install rain barrels or cisterns to capture rainwater for irrigating plants.
- Consider whether a grey water system or a green roof might be viable options for your home.

Support investment in clean, renewable power in the Tennessee Valley

- Sign up for the Green Power Switch program.
- Consider installing solar or small wind power systems and participating in TVA's Generation Partners program.
- Learn more and sign up at www.kub.org or www.tva.gov.

Reduce your fuel consumption

- When buying a car, look for the most fuel-efficient model that will meet your needs. Always keep cars well maintained and tires full. Avoid unnecessary idling.
- Walk, bike, carpool or take the bus to work. Visit http://smarttrips.knoxtrans.org for ideas and incentives that make it easy.
- Use Knoxville's greenway and parks network for fuel-free transportation and recreation. See maps and information at www.cityofknoxville.org/greenways.
- When looking for a new home, live near to where you work, shop and play.

Reduce, Reuse and Recycle your waste stream

- Find information about how, what, and where you can recycle in Knoxville at www.cityofknoxville.org/solidwaste/recycle.
- Avoid products with excessive or non-recyclable packaging.
- Compost your organic waste.

Support the local economy

- Buy locally-grown foods and locally-produced goods.

Knoxville Market Square Farmer's Market

GET INVOLVED!

Knoxville's Energy Inventory: Government and Community Analysis and Strategic Plans

An in-depth report of the inventory results, research methods, and analysis, "City of Knoxville Energy & Emissions Report: 2005," is available online at www.cityofknoxville.org/policy/energy.

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CITY OF KNOXVILLE
BILL HASLAM, MAYOR

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